REMARKS

Claims 1, 3-14 are pending. Reconsideration and allowance of the present application based the following remarks are respectfully requested.

Claim Rejection – 35 USC § 103

Claims 1, 3-12 and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gelernt (U.S. Patent No. 6,369,398) in view of Kleinschmidt (U.S. Patent No. 6,160,832). Applicant respectfully traverses this rejection for at least the following reasons.

Claim 1 recites a lithographic projection apparatus comprising, *inter-alia*, "an acoustic sensor constructed and arranged to detect sounds caused by the passage of pulses of radiation of the projection beam; and a controller in communication with said acoustic sensor and responsive to an output signal of said acoustic sensor, wherein said controller is configured to control a radiation energy per unit area delivered by said projection beam of radiation to said substrate in response to said output signal of said acoustic sensor."

Claim 13 recites an integrated circuit device manufacturing method comprising, *inter-alia*, "detecting one of: sounds caused by the passage of pulses of radiation of said projection beam; vibrations in an object on which said projection beam is incident, and sounds emitted by an object on which said projection beam is incident and controlling, responsive to the detecting, the radiation energy per unit area delivered by said projection beam to said substrate during an exposure of a target portion."

By detecting sounds caused by the passage of pulses of radiation, a direct and in situ measurement of the projection beam intensity and/or changes of the projection beam intensity at, for example, the substrate level is determined. This allows, for example, to achieve accurate dose control of radiation reaching the substrate.

The Office Action concedes that Gelernt does not disclose, teach or suggest the use of an acoustic sensor in detection and control of light intensity.

Moreover, Gelernt is merely concerned about selecting a wavelength at which the absorption of ultraviolet radiation by molecular oxygen is minimized. According to Gelernt, if lithography is performed at an irradiating wavelength around the selected wavelength, the stringent requirement for high vacuum or inert gas purge system can be relaxed. Since the absorption spectrum of molecular oxygen is generally known to one of skill in the art, Gelernt selects a wavelength in the VUV range at which the absorption by molecular oxygen is at its

minimum. Consequently, Gelernt does not need and would not benefit from an acoustic detection device to select a wavelength of ultraviolet radiation which corresponds to a minimum absorption of molecular oxygen. Therefore, there is no motivation to use an acoustic detection device in Gelernt.

The Examiner contends that Kleinschmidt discloses a lithography source calibration apparatus that may use a microphone for photoacoustic detection. The Examiner further contends that Kleinschmidt also discloses a main control unit 4 which communicates electronically with a motor drive 6 for a line-narrowing and tuning block 5 and a signal processing driving source 3 detects changes in current through the galvatron when irradiated with narrow bandwidth radiation matching a transition line of the gaseous element 21.

Kleinschmidt merely discloses a wavelength calibration system which is used for determining the absolute wavelength of an Excimer laser or a molecular fluorine laser. The wavelength calibration system of Kleinschmidt uses preferably a galvatron containing an element that photo-absorbs around the wavelength of the laser or a microphone for acoustic detection of the laser for wavelength calibration. Therefore, Kleinschmidt simply uses a microphone for wavelength calibration of a laser.

Furthermore, in Kleinschmidt, the signal and driving source 3 detects changes in current through the galvatron 2 when irradiated with narrow bandwidth radiation matching a transition line of the gaseous element 21. The control unit (main processing and data recording element) 4 communicates with the signal processing and driving source 3. When a coincidence of the wavelength of the narrowed spectral beam with one of the optical transition lines of the element 21 occurs, as discovered by a marked voltage increase, a fine tuning across the known waveform of the line proceeds for determining more precisely the absolute position of the narrowed band (see col. 8, lines 44-51 in Kleinschmidt), i.e. for determining the absolute wavelength of the laser.

Consequently, the control unit 4 in Kleinschmidt is merely used for wavelength calibration, i.e., to determine precisely the absolute wavelength of the laser. The control unit 4 in Kleinschmidt is not used to control a radiation energy per unit area delivered by the laser in response to the output signal of the microphone.

Thus, even if one were to use the galvatron or the microphone of Kleinschmidt in the apparatus of Gelernt, which Applicant does not concede, the apparatus of Gelernt would merely be able to calibrate or tune the wavelength of ultraviolet radiation and not control a radiation energy per unit area of the ultraviolet radiation.

Consequently, neither Gelernt nor Kleinchmidt, alone or in combination, disclose, teach or suggest, *inter-alia*, "an acoustic sensor constructed and arranged to detect sounds caused by the passage of pulses of radiation of the projection beam; and a controller in communication with said acoustic sensor and responsive to an output signal of said acoustic sensor, wherein said controller is configured to control a radiation energy per unit area delivered by said projection beam of radiation to said substrate in response to said output signal of said acoustic sensor," as recited in claim 1 and, *inter-alia*, "detecting one of: sounds caused by the passage of pulses of radiation of said projection beam; vibrations in an object on which said projection beam is incident, and sounds emitted by an object on which said projection beam is incident and controlling, responsive to the detecting, the radiation energy per unit area delivered by said projection beam to said substrate during an exposure of a target portion," as recited in claim 13.

Therefore, Applicant respectfully submits that claims 1 and 13, and claims 3-12 and 14, which are dependent from either claim 1 or claim 13, are patentable. Thus, Applicant respectfully requests that the rejection of claims 1, 3-12 and 14 under § 103(a) be withdrawn.

Claims 5-10 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gelernt (U.S. Patent No. 6,369,398) and Kleinschmidt (U.S. Patent No. 6,160,832) in view of Yamaguchi (U.S. Patent No. 5,333,495). Applicant respectfully traverses this rejection for at least the following reasons.

Claim 5 depends from claim 1. With regard to claim 5, the Office Action concedes that Gelernt in view of Kleinschmidt does not disclose the use of a vibration sensor mechanically coupled to an object on which the projection beam is incident. Furthermore, as stated above with respect to claims 1 and 13, neither Gelernt nor Kleinschmidt, alone or in combination, disclose, teach or suggest "a controller in communication with said acoustic sensor and responsive to an output signal of said acoustic sensor, wherein said controller is configured to control a radiation energy per unit area delivered by said projection beam of radiation to said substrate in response to said output signal of said acoustic sensor," as recited in claim 1 or "controlling, responsive to the detecting, the radiation energy per unit area delivered by said projection beam to said substrate during an exposure of a target portion," as recited in claim 13.

Yamaguchi does not overcome the deficiencies noted above in the combination of Gelernt and Kleinschmidt. Yamaguchi does not disclose, teach or suggest "a controller in

communication with said acoustic sensor and responsive to an output signal of said acoustic sensor, wherein said controller is configured to control a radiation energy per unit area delivered by said projection beam of radiation to said substrate in response to said output signal of said acoustic sensor."

Consequently, for at least the above reasons, Applicant respectfully submits that none of Gelernt, Kleinschmidt and Yamaguchi, taken alone or in combination, disclose, teach or suggest the subject matter recited in claims 5 and 13.

Therefore, Applicant respectfully submits that claims 1 and 13, and claims 5-10 which are dependent from claim 1, are patentable. Thus, Applicant respectfully requests that the rejection of claims 5-10 and 13 under § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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